Spring 1-1-2020

MNET 303-104: Advanced Techniques in CAD/CAM

Joseph Beshay

New Jersey Institute of Technology
Department of Engineering Technology
MNET 303 Advanced Techniques in CAD/CAM

COURSE NUMBER	MNET 303
COURSE NAME	Advanced Techniques in CAD/CAM
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/Mr. J. Beshay
COURSE DESCRIPTION	Applications including hands-on experience with CAD/CAM systems. Emphasis is on understanding how displayed objects are represented and manipulated on the computer. Laboratory experiences contribute to an understanding of the advantages and limitations of CAD/CAM systems.
PREREQUISITE(S)	MET 105
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective
REQUIRED MATERIALS	Paul J. Schilling, Randy H. Shih Parametric Modeling with Solidworks 2019. SDC Publications 2019, ISBN: 9781630572259
COMPUTER USAGE	Software: ***Solidworks***.
COURSE LEARNING OUTCOMES(CLO)	By the end of the course students should be able to: 1. Develop CAD models with Parametric CAD software. 2. Develop CAM models with CAM software. 3. Apply knowledge of Manufacturing and Inspection processes to CAD/CAM. 4. Conduct Engineering Analysis with CAD/CAM. 5. Prepare Engineering documents/reports.
CLASS TOPICS	Castings and Forging process, CAD sketch and extrude, Cutting Operations (Mill, Wire EDM, Drill), CAD Mirror & Revolve, Helical Sweep, Pattern, CAM Milling/Drilling, CAM Turning, Inspection Methods, CAD Assembly, Geometric Dimensioning & Tolerancing, CAD 3D Annotation, Part and Assembly Drawing Formats/Templates, Working with STEP Files, Sheet Metal Modeling, Additive Manufacturing, CAD Blend and Shell: **CAD/CAM Project:** Project 1: Each student will describe the manufacturing processes needed to fabricate an existing modeled part. A Project Report will be submitted.

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Project 2: Each student will model the parts for an assembly. Students will prepare engineering drawings for parts and the assembly. Students will conduct engineering evaluation of fit and function. A Project Report will be submitted.

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements:

Student Outcome a - an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
Related CLO – 1-4

Student outcome b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
Related CLO –3-4

Student outcome c - an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
Related CLO – 3-4

Student Outcome d - an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.
Related CLO – 1-4

Student outcome f - an ability to identify, analyze, and solve broadly-defined engineering technology problems
Related CLO – 3-4

Student Outcome g - an ability to communicate effectively regarding broadly-defined engineering technology activities
Related CLO – 5

Student Outcome m - technical expertise having added technical depth in mechanical design, solid mechanics, and electro-mechanical devices and controls.
Related CLO - 1-4

GRADING POLICY

Homework 30 %

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Note: Grading Policy may be modified by Instructor for each Section in the Course)	Project 1 & 2	20 %
	Two Quizzes	30 %
	Final Exam	20 %

Note: There are two quizzes during the semester. There will be no makeup quizzes.

ACADEMIC INTEGRITY

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php

STUDENT BEHAVIOR

- No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.
- Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class, unless allowed by the professor.
- Unless the professor allows the use during lecture, laptops should be closed during lecture.
- During laboratory, if you are finished earlier, you must show the professor your work before you leave class
- Class time should be participative. You should try to be part of a discussion

MODIFICATION TO COURSE

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.

PREPARED BY

Mr. J. Beshay

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COURSE COORDINATED BY Dr. S.Lieber

CLASS HOURS

Monday	5:45 PM – 9:50 PM	2302 GITC Building

OFFICE HOURS

By appointment e-mail joseph.beshay@njit.edu

HOMEWORK & PROJECT - IMPORTANT

Homework

1. Homework sets are due one week after they are assigned. . Late penalty is minus 25% each week. Assignments more than one week late will not be accepted.
2. Homework must be submitted in the format provided by the professor.
3. Projects are due on the dates indicated. No late projects will be accepted.
4. Projects should be submitted in the format provided by the professor.

GRADING LEGEND

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

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COURSE OUTLINE

Week	Topics	Homework Assignment
1 January 27	Description of Castings & Forgings Introduction to Solid Modeling (Solidworks) • Introduction (Chapter 1) • Parametric Modeling Fundamentals (Chapter 2)	1. Chapter 2 Tutorial 2. Chapter2: 3, 4
2 February 3	Description of Cutting Operations (Mill, Wire EDM, Drill) Solid Modeling: • Constructive Solid Geometry Concepts (Chapter 3) • Idler Arm Part **Project 1 Assigned**	1. Chapter 3 Tutorial 2. *Bearing* (Chapter 14 p. 14-6) 3. Idler Arm Tutorial
3 February 10	Description of Turning Operations (Screw Threads) Solid Modeling: • Revolve, Helical Sweep, Pattern • Thumb Screw	1. Thumb screw Tutorial 2. Start U-Bracket (Chapter 7) 3. Cap Screw (Chapter 14 p. 14-7 with Thread and Relief)
4 February 17	Symmetrical Features in Design (Chapter 11)	1. Pulley (Chapter 11, p. 11-1thru 11-17) 2. Finish U-Bracket (Chapter 7) 3. Base-Plate (Ch. 14, p. 14-6) 4. Collar (Ch. 14, p. 14-4)
5 February 24	**Quiz #1** Description of Inspection Methods Solid Modeling: • Assembly (Chapter 14)	1. **Finalize Project 1** 2. Shaft Support Assembly (14-1 thru 14-28)
6 March 2	**Project 1 Submitted** Dimensioning/Tolerancing & GD&T Part 1 Solid Modeling: • Part Drawings & Associative Functionality (Chapter 8)	1. Chapter 8 Tutorial 2. Pulley Drawing (11-18 thru 11-32)
7 March 9	Dimensioning/Tolerancing & GD&T Part 2 Solid Modeling: 3. Reference Geometry & Auxillary Views (Chapter 9) **Project 2 Assigned**	1. Chapter 9 Tutorial a. Create Part Drawing with Overall Dimensions 2. GD&T Homework
SPRING BREAK 3/15-3/22		

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Week	Topics	Homework Assignment
8 March 23	Dimensioning/Tolerancing & GD&T Part 3 Solid Modeling: • Assembly Drawings	1. Shaft Support Assembly Drawing (14-29 thru 14-37) 2. Shaft Hanger Tutorial a. Create Part Drawing with Overall Dimensions
9 March 30	Solid Modeling: • Sheet Metal Part 1	1. Sheet Metal Designs (Chapter 13)
10 April 6	**Quiz #2** Solid Modeling: • Sheet Metal Part 2	1. Support Bracket Tutorial a. Create Part Drawing with Overall Dimensions
11 April 13	Additive Manufacturing (Ch. 10) • STL File generation Tutorial (10-12 thru 10-25) Solid Modeling: • Blend/Shell • Dryer Housing (Chapter 12)	1. Chapter 10 STL Tutorial 2. Dryer Housing (Chapter 12)
12 April 20	Master Cam Tutorials • Introduction	1. MasterCAM Intro. Tutorial
13 April 27	Master Cam Tutorials • Lathe	1. Lathe Tutorial 2. **Finalize Project 2**
14 May 4	**Submit Project 2** Solid Modeling: • Family Table	Cotter Pin Tutorial • Create Part Drawing with Overall Dimensions
15 TBD	**Final Exam**	